



FIG. I



201 → STUDENT (SID, SNAME, MAJOR)
CLASS (CID, CNAME, TIME, ROOM)

STUDENT_CLASS (SID, CID)

OLD WAY-USE STUDENT_CLASS TO MODEL RELATIONSHIP

202 → STUDENT (SID, SNAME, MAJOR, CIDBS)
CLASS (CID, CNAME, TIME, ROOM, SIDBS)

NEW WAY-USE BITSETS CIDBS AND SIDBS TO MODEL
RELATIONSHIP

FIG.2

401 → OLD WAY

CATEGORY (CATEGORYID BIGINT)
DOCUMENT (DOCUMENTID BIGINT)
PARENT CHILD ASSOCIATIONS (CHILID BIGINT, PARENTID
BIGINT)

402 → NEW WAY

CATEGORY (CATEGORYID BIGINT, BSDOCUMENT BITSET,
BSPARENT BITSET, BSCHILD BITSET)
DOCUMENT (DOCUMENTID BIGINT)

FIG.4

1,2,3,4,5,6,7,8,9
10,11,12,13

1,2,3,4,5,6,7,8,9
10,11,12,13

**INTELLISTATION
EPRO**

11,12 INTELLI STATION MPRO

**INTELLISTATION
ZPRO**

MACHINE TYPE:

8
6868

6889
6,7

1,2,3,4,5,6,7,
11,12,13

6897
9,10

**MODEL
NUMBER:**

15K	1,2
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3	15U
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3,6,7,11,
12,13

15V
4,5

3,6,7,11
12,13

PRODUCT INSTANCES:

23H3470
6889-15U

23H3471
6889-15U

3, 6, 7, 11,
12, 13

FIG. 3

FIG.5

NOR RULES: INPUT ALL FALSE ⇒ OUTPUT TRUE

INPUT TRUE EXPRESSIONS	ANDISEMPTY EVALUATES TO FALSE	RETURNS FALSE NOR RULES
INPUT FALSE EXPRESSIONS + OPTIONAL	ANDEQUALS EVALUATES TO TRUE	RETURNS TRUE NOR RULES

OR RULES: INPUT ALL FALSE ⇒ OUTPUT FALSE

INPUT TRUE EXPRESSIONS	ANDISEMPTY EVALUATES TO FALSE	RETURNS TRUE OR RULES
INPUT FALSE EXPRESSIONS + OPTIONAL	ANDEQUALS EVALUATES TO TRUE	RETURNS FALSE OR RULES

NAND RULES: INPUT ALL TRUE ⇒ OUTPUT FALSE

INPUT TRUE EXPRESSIONS + OPTIONAL	ANDEQUALS EVALUATES TO TRUE	RETURNS FALSE NAND RULES
INPUT FALSE RULES	ANDISEMPTY EVALUATES TO FALSE	RETURNS TRUE NAND RULES

AND RULES: INPUT ALL TRUE ⇒ OUTPUT TRUE

INPUT TRUE EXPRESSIONS + OPTIONAL	ANDEQUALS EVALUATES TO TRUE	RETURNS TRUE AND RULES
INPUT FALSE EXPRESSIONS	ANDISEMPTY EVALUATES TO FALSE	RETURN FALSE AND RULES